In the claims:

1. (currently amended) A method of modelling energy transfer ~~by way of an energy transfer profile~~ for ~~an~~ a cyclical application environment utilizing a battery as an energy source, said method comprising the steps of:

a) receiving sensor data for the application environment, said sensor data being related to energy consumption of a cycle of the application environment;

b) receiving one or more charge parameters for the battery including a charge schedule, the charge schedule defining times and time intervals during which the battery is available for charging;

c) generating an ~~determining the~~ energy transfer profile ~~for~~ modeling the battery state of charge over time in future cycles of the application environment ~~the energy consumer~~ based upon ~~said~~ the received sensor data and the received charge parameters, said step including determining one or more energy needs for the application environment and applying a charge return model based upon said charge parameters; and

making available the energy transfer profile;

wherein ~~the charge schedule defines times and time intervals during which the battery is available for charging, and wherein~~ the charge return model is constrained by the charge schedule.

2. (currently amended) The method as claimed in claim 1, further including the step of receiving one or more application environment parameters for said step of ~~determining~~ generating the energy transfer profile.

3. (original) The method as claimed in claim 1, wherein said step of determining the energy needs of the application environment includes obtaining a discharge value for the battery from said sensor data.

4. (original) The method as claimed in claim 2, wherein said step of determining the energy transfer profile includes incrementally calculating battery parameters and a battery state of charge over time based upon said energy needs and said charge return model.

5. (previously presented) The method as claimed in claim 4, wherein said step of calculating said battery state of charge over time includes incrementally calculating a charge returned to the battery as a result of said charge return model.

6. (original) The method as claimed in claim 4, wherein said battery parameters include a battery internal resistance and a battery temperature.

7. (original) The method as claimed in claim 6, wherein said step of calculating battery parameters includes determining a change in said battery temperature based upon a difference between heat generated and heat dissipated.

8. (original) The method as claimed in claim 7, wherein said heat generated is calculated as a product of said battery internal resistance and a battery current product.

9. (original) The method as claimed in claim 8, further including the step of determining said heat dissipated based on a calculation of surface-to-air convection from an external surface of the battery.

10. (original) The method as claimed in claim 9, wherein the battery comprises an air-gapped battery, and wherein said step of determining said heat dissipated includes a calculation of heat dissipated through parallel-plate convection within said air-gapped battery.

11. (original) The method as claimed in claim 4, wherein said charge return model is selected from a group including IVI, modified IVI, and controlled-feedback rapid charging.

12. (original) The method as claimed in claim 1, wherein said sensor data includes voltage and current measurements taken over time for the battery.

13. (original) The method as claimed in claim 12, further including the step of recording said sensor data with a data recording unit coupled to the battery while operating in the application environment.

14. (original) The method as claimed in claim 13, wherein said recorded sensor data includes temperature measurements.

15. (original) The method as claimed in claim 14, wherein said recorded sensor data includes discharge measurements taken over a time interval.

16. (currently amended) A method for generating an energy transfer profile ~~for~~ modelling energy transfer in a vehicle utilizing a battery as an energy source in a cyclical application environment, said method comprising the steps of:

a) receiving recorded sensor data for the vehicle relating to energy consumption over time for a cycle of the application environment;

b) receiving a plurality of parameters including one or more charge parameters including a charge schedule through a user input interface, the charge schedule defining times and time intervals during which the battery is available for charging;

c) determining an energy requirement for the vehicle and applying a charge return model based upon said charge parameters;

d) generating the energy transfer profile for the vehicle modeling the battery state of charge over time in future cycles of the application environment based upon said recorded sensor data and said parameters~~; determining an energy requirement for the vehicle and applying a charge return model based upon said charge parameters;~~ and

e) outputting the energy transfer profile~~; wherein the charge schedule defines times and~~

~~time intervals during which the battery is available for charging~~.

17. (original) The method as claimed in claim 16, wherein said step of determining the energy requirement for the vehicle comprises obtaining a discharge value for the battery from said recorded sensor data.

18. (original) The method as claimed in claim 17, wherein said step of generating the energy transfer profile comprises incrementally calculating battery parameters and calculating a battery state of charge based on said energy requirement and said charge return model.

19. (previously presented) The method as claimed in claim 18, wherein said step of calculating said battery state of charge includes incrementally calculating a charge returned to the battery based on said charge return model subject to said charge schedule.

20. (currently amended) A system for generating an energy transfer profile for modelling energy transfer for ~~an~~ a cyclical application having a battery, said system comprising:

a) a memory for storing sensor data corresponding to energy consumption during a cycle of the application;

b) a user input interface for receiving application parameters and one or more charge parameters including a charge schedule, the charge schedule defining times and time intervals during which the battery is available for charging;

c) an energy transfer module having an input port for receiving said sensor data and said application parameters, said energy transfer module including a component responsive to said sensor data and said application parameters for generating the energy transfer profile modeling the battery state of charge over time in future cycles of ~~for~~ the application, and a component for applying a charge return model based on said charge parameters; and

d) a component for outputting the energy transfer profile;

wherein the ~~charge schedule defines times and time intervals during which the battery is available for charging, and wherein the~~ charge return model is constrained by the charge

schedule.

21. (original) The system as claimed in claim 20, further including a component for determining an energy requirement, said component being responsive to a discharge rate for the battery, said discharge being determined from said sensor data.

22. (original) The system as claimed in claim 21, wherein said energy transfer module includes a component for calculating battery parameters and a component for calculating a battery state of charge over time based upon said energy requirement and said charge return model.

23. (previously presented) The system as claimed in claim 22, wherein said energy transfer module includes a component for incrementally calculating a charge returned to the battery based on said charge return model.

24. (original) The system as claimed in claim 23, wherein said charge return model is selected from a group including IVI, modified IVI, and controlled-feedback rapid charging.

25. (original) The system as claimed in claim 24, further including a data recorder unit having inputs for inputting said sensor data from the battery while operating in the application.

26. (original) The system as claimed in claim 25, wherein said sensor data includes discharge measurements taken over an interval of time.

27. (original) The system as claimed in claim 26, further including an output device coupled to said energy transfer module for outputting a graphical representation of said energy transfer profile.

28. (original) The system as claimed in claim 27, wherein the graphical representation of

said energy transfer profile includes a battery state of charge over time and a graphical representation of battery temperature over time.

29. (currently amended) A system for modelling energy transfer ~~using an energy transfer profile~~ for ~~an~~ a cyclical application environment utilizing a battery as an energy source, said system comprising:

a) means for receiving sensor data for the application environment, said sensor data being related to energy consumption during a cycle of the application environment;

b) means for receiving one or more charge parameters for the battery including a charge schedule, the charge schedule defining times and time intervals during which the battery is available for charging;

c) means for determining ~~the~~ an energy transfer profile modeling the battery state of charge over time in future cycles of the application environment ~~for the energy consumer~~ based upon said sensor data and said charge parameters, said energy profile determining means including means for determining one or more energy needs for the application environment and means for applying a charge return model based upon said charge parameters; and

d) means for outputting the energy transfer profile;

~~wherein the charge schedule defines times and time intervals during which the battery is available for charging, and~~

wherein said charge return model is constrained by the charge schedule.

30. (original) The system as claimed in claim 29, further including means for receiving one or more application environment parameters, and said energy profile determining means being responsive to said application environment parameters.

31. (original) The system as claimed in claim 29, wherein said means for determining the energy needs of the application environment includes means for obtaining a discharge value for the battery from said sensor data.

32. (original) The system as claimed in claim 30, wherein said energy profile determining means includes means for incrementally calculating battery parameters and a battery state of charge over time based upon said energy needs and said charge return model.

33. (previously presented) The system as claimed in claim 32, wherein said means for calculating said battery state of charge over time includes incrementally calculating a charge returned to the battery as a result of said charge return model.

34. (original) The system as claimed in claim 32, wherein said means for calculating battery parameters includes means for determining a change in said battery temperature based upon a difference between heat generated and heat dissipated.

35. (original) The system as claimed in claim 34, wherein said charge return model is selected from a group including IVI, modified IVI, and controlled-feedback rapid charging.

36. (original) The system as claimed in claim 29, wherein said sensor data includes voltage and current measurements taken over time for the battery.

37. (original) The system as claimed in claim 36, further including means coupled to the battery for recording said sensor data with the battery operating in the application environment.

38. (original) The system as claimed in claim 37, wherein said recorded sensor data includes temperature measurements.

39. (original) The system as claimed in claim 38, wherein said recorded sensor data includes discharge measurements taken over a time interval.

40. (currently amended) A computer program product having a computer-readable medium tangibly embodying computer executable instructions for ~~generating an energy transfer~~

~~profile for~~ modelling energy transfer for ~~an~~ a cyclical application environment having a battery, said computer executable instructions comprising:

a) computer executable instructions for receiving recorded sensor data for the application environment regarding energy consumption over time of a cycle of the application environment;

b) computer executable instructions for receiving application environment parameters through a user input interface, including one or more charge parameters including a charge schedule, the charge schedule defining times and time intervals during which the battery is available for charging;

c) computer executable instructions for generating ~~the~~ an energy transfer profile modeling the battery state of charge over time in future cycles of ~~for~~ the application environment based upon said sensor data and said application environment parameters, wherein said step of generating the energy transfer profile includes determining an energy requirement for the application environment and applying a charge return model based upon said charge parameters for the energy transfer profile; and

d) computer executable instructions for outputting the energy transfer profile~~; wherein the charge schedule defines times and time intervals during which the battery is available for charging~~.

41. (original) The computer program product as claimed in claim 40, wherein said computer executable instructions for determining an energy requirement for the application environment includes computer executable instructions for obtaining a measured discharge value for the battery from said sensor data.

42. (original) The computer program product as claimed in claim 41, wherein said computer executable instructions for generating the energy transfer profile include computer executable instructions for calculating battery parameters and computer executable instructions for calculating a battery state of charge over time based upon said energy requirement and said charge return model.

43. (previously presented) The computer program product as claimed in claim 42, wherein said step of calculating said battery state of charge over time includes incrementally calculating a charge returned to the battery as a result of said charge return model constrained by said charge schedule.

44. (original) The computer program product as claimed in claim 43, wherein said computer executable instructions for determining the energy transfer profile includes computer executable instructions for calculating a battery state of charge over time, and wherein said computer executable instructions for outputting said energy transfer profile includes computer executable instructions for producing a graphical representation of said battery state of charge over time.

45. (original) The computer program product claimed in claim 44, wherein said graphical representation further includes a graphical representation of a battery temperature over time.